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LARYNGEAL AND POSTNASAL PHOTOGRAPHY WITH THE AID OF THE ARC LIGHT.*

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THE application of the sensitive photographic plate in place of the human eye to physiological and pathological studies of the throat and nose opens vast possibilities. We are thus enabled to ascertain with accuracy what before had to be intrusted to the power of perception of the eye. The existence of conditions or matter in this way revealed can not be so clearly reached by any other visual process, and every impression recorded in minutest detail on the sensitive plate is preserved for our study. Again, the results thus obtained can be verified at every step and any statement or scientific truth becomes valuable only as it admits of verification. This fact makes me feel that the art of laryngeal or post-nasal photography is worthy of our closest study.

How far-reaching the practical results or how great the benefits to be derived from this work we can not know, but having recognized in it the possibilities of a great power for knowledge, which needs must increase in proportion to the opportunities given it, the writer believed that its usefulness ought to be extended, and this, it was apparent, could only be done by simplifying

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the method of work. With this end in view, an effort was made to overcome some of the disadvantages of the method which I described at the International Medical Congress, held in Copenhagen, in 1884. The principal difficulty with that method was that the source of illumination was sunlight. The necessity of limiting the

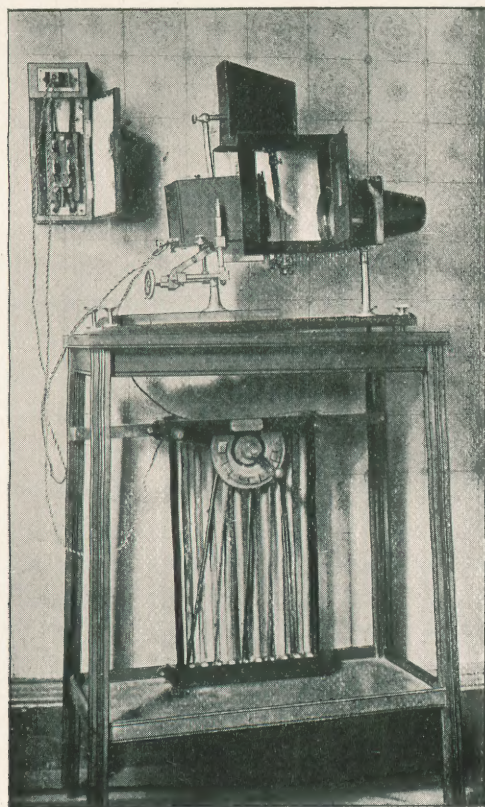


FIG. 1.

use of the method to a few hours on days on which the sun shone brightly, added to the varying power of the sun's rays and consequent uncertainty of the success of the exposures, reduced its usefulness to a very considerable extent. During the past few months I have, however, succeeded in adapting the electric arc light

to the method. With sunlight as a power of illumination it was necessary to bring the subject to the light. With the new method we can bring the light to the subject, and at any time, day or night, good photographs can be taken. This will undoubtedly enhance the value of laryngeal and postnasal photography, for with it greater opportunities will be presented for the study of the interior of the larynx, the posterior nares, and the vault of the pharynx in normal and pathological states.

As the distance between the camera and object to be photographed is necessarily very short, one of the greatest difficulties was to adjust the light to the sensitive plate so that a depth of focus would be obtained. To do this a small diaphragm, a rapid shutter, a very sensitive plate and a powerful light must be used.

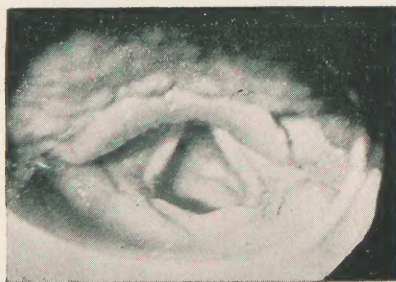


FIG. 2.

The necessary outfit for producing a sufficiently powerful light is represented in Fig. 1. It consists of an automatic two-thousand-candle-power lamp partly inclosed in a metal box. The front face of the box carries a condensing lens which, when placed nine inches from the arc, gives a focal distance of twenty inches. This relation of light and lens was found to give the most satisfactory illumination. The lamp and accessories are fitted to a narrow board which is placed upon a table of sufficient height. The light can be raised or lowered by means of a device designed for that purpose. The rheostat is placed upon a shelf beneath the table top. The whole light outfit

is but a modification of the electric stereopticon. This one is so arranged that by adding a second condensing lens and an objective lens to the end of the cone-shaped tube in front it can be used as a projecting lantern.*

The manner of using the light in photographing the larynx or posterior nares is the same as I described it in connection with the sunlight condenser.† The beam of light should be caught upon the forehead mirror several inches inside of the point of focus. Good photographs can usually be obtained at the first sitting, though sometimes two sittings are required, for it is not always possible immediately to find the focus or determine the amount of light needed. At the second sitting of one patient I made eighteen exposures and

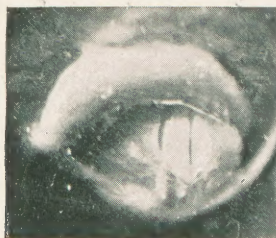


FIG. 3.

obtained fourteen good impressions. If the apparatus is in order the time needed to secure a photograph of any larynx does not exceed that necessary for making a careful laryngoscopic examination.

As the apparatus was not perfected till last month I have not been able to make a large collection of photographs, but with your permission I will exhibit a few pictures on the screen which fairly illustrate the perfection which the art has reached. While these photographs are, perhaps, quite as good as those taken

* Though I have not yet had an opportunity to test it, I am inclined to the belief that the new self-feeding and self-focusing arc lamp recently placed on the market will answer the purpose even better. The apparatus used in these experiments was made for me by Charles Beseler, of New York.

† *New York Medical Journal*, December 13, 1884.

by the aid of sunlight, I feel convinced that a few changes and additions which I have in mind will give even better results.*

Fig. 2 represents a normal larynx in quiet respiration and is a fair illustration of the kind of photograph it is possible to take with the new method.†

Only those parts will be impressed upon the plate



FIG. 4.

which receive the light directly from the mirror. When the epiglottis is greatly curled upon itself it is very difficult to get a picture of the whole length of the vocal bands, because the axis of the lens and the line of illumination are not the same. If the interior of the larynx, in such cases, is completely exposed to the lens, the illumination must be made obliquely, which, of course, gives deep shadows. If, on the contrary, the larynx is fully illuminated through a horseshoe epi-

* Twenty-one photographs were shown in a lantern-slide exhibit, eight of which have been reproduced for publication in this article.

† The photographs shown in this article have not received any kind of artistic assistance. They have lost considerably by the process of reproduction, and a slight amount of retouching, such as is usually done with reproductions by the half-tone process, would make them as strong as the original negatives. While retouching might be legitimate and even advantageous in some instances, it would be a dangerous practice in most cases, for if the retouching was not skillfully done, or the lines and shadows were not accurately copied, the results would be disastrous to physiological and pathological studies made with this method. It may be appropriate for me to say here that I have never permitted retouching to be done to any of the negatives of the larynx or posterior nares which I have made.

glottis, the exposure must be made somewhat obliquely, which necessarily precludes an impression of the whole of the interior of the cavity.

The angle of the mirror employed is an important matter. The more acute the angle the greater the liability of exposing only the anterior portion of the larynx and the base of the tongue, and also of the tongue intercepting the exposure to the lens. When a mirror with too obtuse an angle is employed, in order to expose the parts satisfactorily to the eye, the camera must be lifted so high that the line of exposure will be above the line of illumination. This again will result in exposing only the anterior parts of the larynx. I use two mirrors for each sex; one with an angle of a hundred and thirty-five degrees, the other of a hundred and forty degrees to the axis of the lens. One or the other of these is capable of being adapted to any throat, so that the lines of illumination and exposure will be the same.

Another interesting feature in laryngeal photography is shown in Fig. 3. I refer to the difference in the width of the vocal bands. Though this, no doubt,

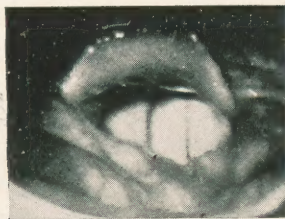


FIG. 5.

is due to the mirror being held somewhat obliquely in this photograph, the same effect is not produced in the photographs of every larynx, even when the mirror is held more obliquely than it was in this instance. The only explanation I can give of the cause of this effect is that the ventricular bands lie at a greater distance from the vocal bands than is usual, and naturally

the higher their position, if the mirror is not held exactly in the median line, the more one ventricular band will cut off a view of the vocal band on the mirror side.

In the next photograph (Fig. 4) it can be seen that the

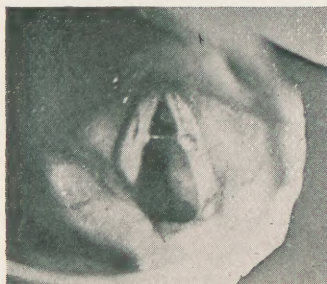


FIG. 6.

mirror must have been held more to the side than in the one we have just criticised, and yet the vocal bands seem to be of equal width. The openings of the ventricles of the larynx are presumably quite narrow in this case. This photograph also represents mild ca-

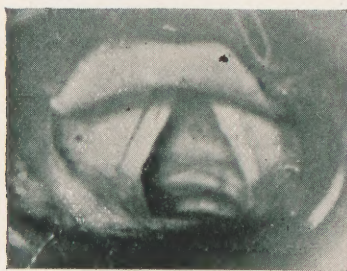


FIG. 7.

tarrhal laryngitis. The outer edges of the vocal bands are moderately congested, and a considerable amount of mucus can be seen in the glottic chink.

The photograph represented in Fig. 5 shows the larynx of one of the sopranos of the German Opera Company who sang in this country during the past season. For reasons of her own the lady prefers that I

should not make public use of her name. She suffered from a cold during the latter part of her engagement, but was forced by her contract to sing while the larynx was the seat of active congestion. The condition of her



FIG. 8.

larynx which was present just before she sailed for Europe can be seen in the picture. The edges of the vocal bands have lost their sharp definition because of the presence of catarrhal secretion.

The next photograph (Fig. 6) is exhibited to show a small growth on the left vocal band in the larynx

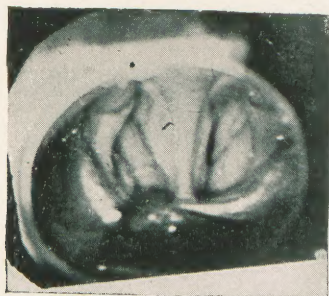


FIG. 9.

of a Sister of Charity who had strained her voice in singing. She was moderately hoarse, and was unable to use any of the tones above the middle of her compass in singing. I removed the growth with tube forceps two weeks ago and sent it to Dr. Jonathan Wright for microscopic examination. He reported later that it was a simple inflammatory neoplasm, as I had supposed.

Fig. 7 represents the appearance of the larynx after the removal of the growth shown in Fig. 6.

Fig. 8 shows the larynx of a lady whose pulmonary apices are both consolidated and who has tubercle bacilli in her sputum. The voice is weak, and the cause of it can be seen to be an impaired action of the internal tensors. There is also a spasmodic contraction of the ventricular bands, the effect of which is well shown in the picture.

Fig. 9 is a photographic representation of the rhinoscopic image in a subject with postnasal catarrh, showing evidence of both the hypertrophic and atrophic varieties of the disease.

However complicated the art of photographing the larynx and posterior nares seems, it is nevertheless a simple procedure when once understood, and, though it may be somewhat difficult to acquire, the possibilities of its power of adding to our knowledge of the normal and diseased conditions of the throat and nose must be a sufficient reward for the labor required.

